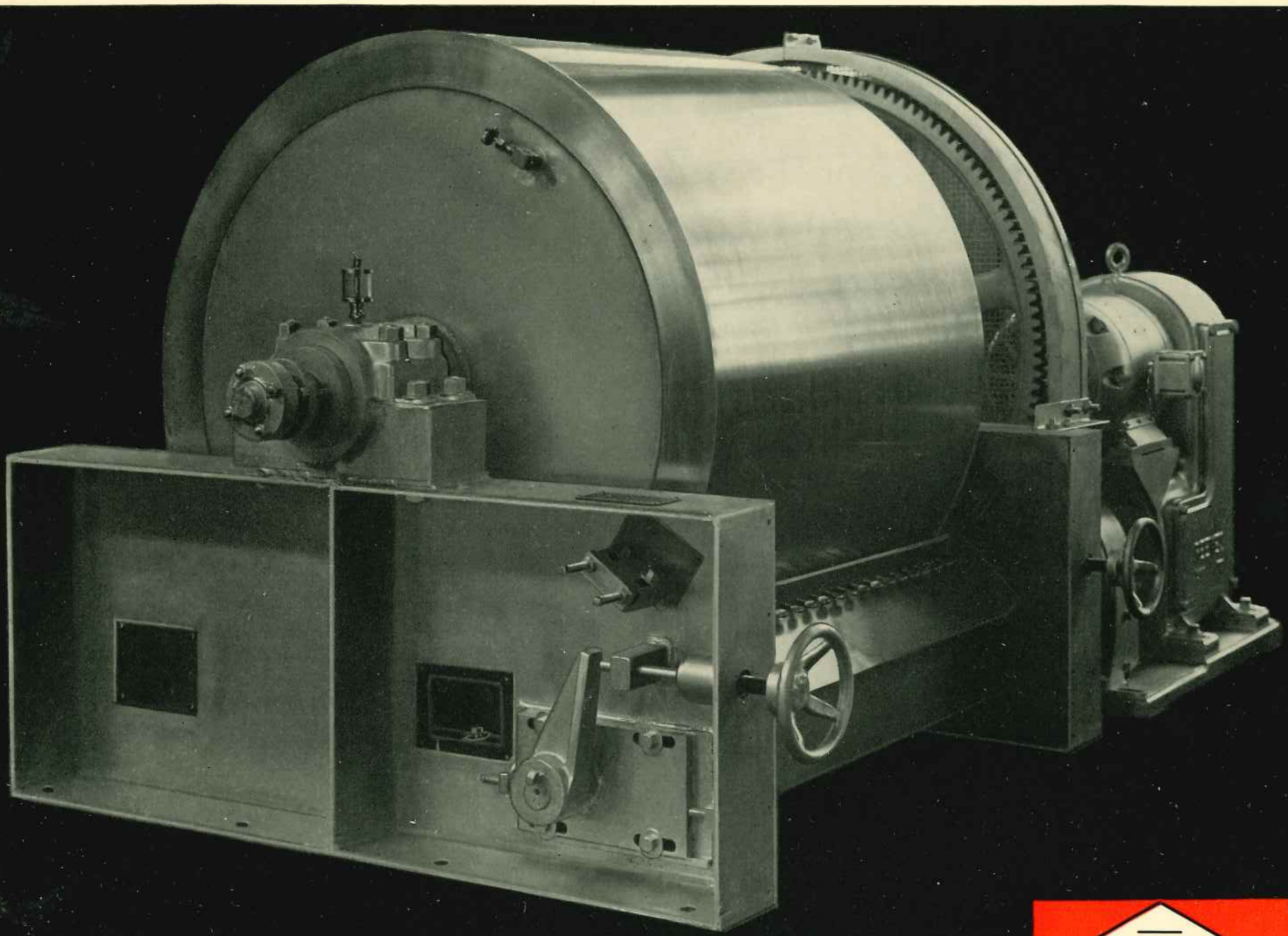
18/1 B
425/6

**BUFLOVAK**

# FLAKERS

## A CONTINUOUS PROCESS FOR COOLING AND FLAKING CHEMICALS



BLAW-KNOX

CATALOG NO.
370

## BLAW-KNOX COMPANY

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

BUFLOVAK EQUIPMENT DIVISION
1543 FILLMORE AVENUE • BUFFALO 11, NEW YORK

U. S. PAT
APR 11 195
DIVISION 15

# Buflovak
# FLAKERS

## A continuous process for COOLING and FLAKING CHEMICALS

**SOME OF THE PRODUCTS THAT ARE FLAKED ON BUFLOVAK FLAKERS**

Acetanilide
Alpha Naphthylamine
Antimony Chloride
Benzene Hexachloride
Benzidine
Benzoic Acid
Beta Naphthol
Calcium Chloride
Caustic Potash
Caustic Soda
Chromic Acid
Chloro Acetic Acid
D.D.T.
2-4 D Salts
Fatty Acids
Hexachlorobenzene
Hexachloro Cyclohexane
Intermediates
Magnesium Chloride
Naphthalene
Naphthylamine
Niter Cake
Para-Dichlorobenzene
Paraffin
Phthalic Anhydride
Pitch
Resorcin
Soap
Sodium Acetate
Sodium Silicate
Sodium Sulfide
Stearates
Stearic Acid
Sulphur
Tri Nitro Toluene
Trisodium Phosphate
Waxes
and similar products

CATALOG
370

**BLAW-KNOX COMPANY • Buflovak Equipment Division**

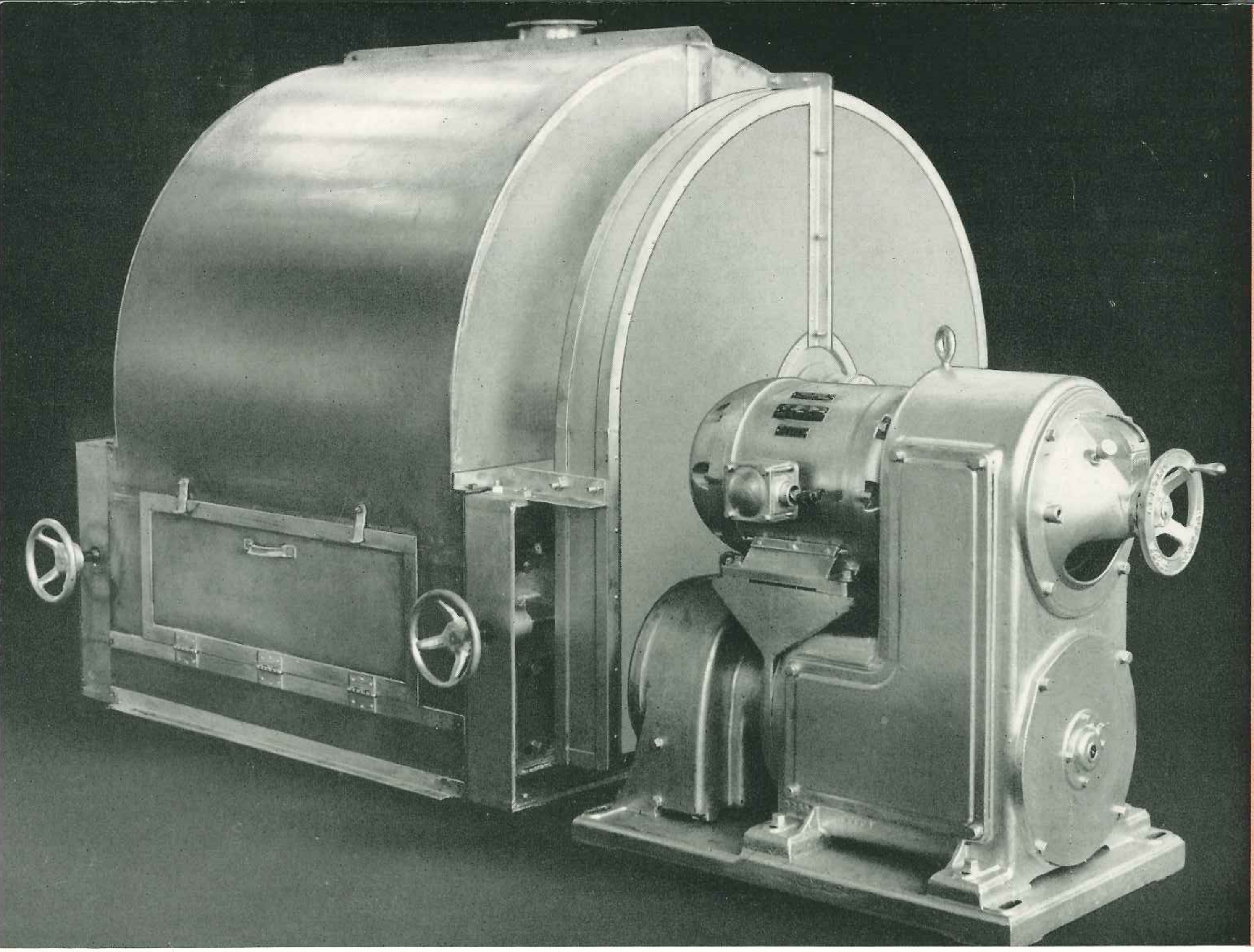


*Fig. 1. BUFLOVAK Enclosed Flaker (48" x 40"), equipped with a direct connected moto-drive through a variable speed transmission. Stainless steel is used for the drum, enclosure, and other parts coming in contact with the material. The hinged door in front gives access to the knife which is adjusted by the two hand wheels.*

# BUFLOVAK FLAKERS

## A CONTINUOUS PROCESS FOR COOLING AND FLAKING CHEMICALS

BUFLOVAK Flakers are extensively used to continuously convert various liquid or molten materials directly into a flaked or granular form. The material is applied to a revolving cooling surface where it quickly and completely solidifies, to be removed by a stationary knife after less than one revolution.

This continuous process economically replaces other forms of solidification; offers improved production at lower cost. Time is saved; working space reduced; fines are eliminated, and the necessity of crushing is avoided. CAPACITY IS HIGH, varying from 10 to 200 lbs. per hour per square foot drum surface.

The finished product can be conveniently and accurately measured and readily dissolved.

The application is varied and extensive, particularly in the chemical industry. The construction and operation of BUFLOVAK Flakers adapts them successfully to practically all the flaking operations of inorganic or organic chemical products having a definite, but not too low a melting point. Included among such materials are caustic soda, caustic potash, sulphur, calcium chloride, sodium sulfide 60%, phthalic anhydride, hexachlorobenzene, stearic acid and similar materials. Other products are salts, which melt and dissolve completely in their water of crystallization, such as tri-sodium phosphate. Flaking is also used for products of a more indefinite composition, like asphalt, pitch, paraffin, and various waxes.

BUFLOVAK Flakers are self-contained units, built in open or enclosed types. The flaker consists principally of a hollow cylindrical drum, which is mounted on two sturdy end frames; a drive mechanism for revolving the drum; a feed device for applying the material to the cooling surface; and a knife, securely held in an adjustable knife holder, for removing the flaked material.

## DRUM

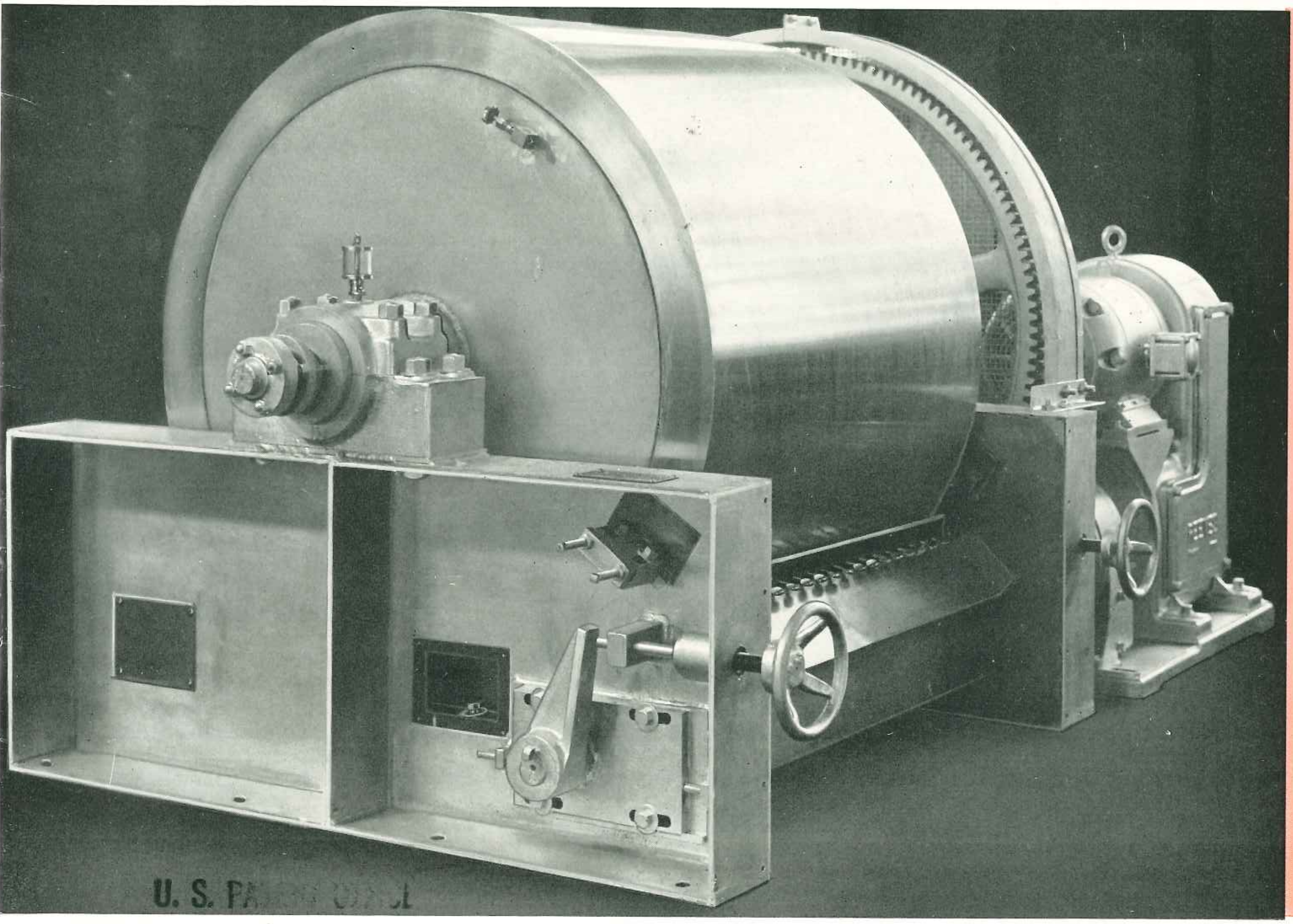
The drum is made of any suitable material, depending upon the product to be handled. For the majority of products, a special close-grained cast iron is used. In applications where corrosion is a factor, or where the product must be protected from metallic contamination or discoloration, drums can be furnished of bronze, stainless steel, nickel, or plated with chromium or hard nickel.

The drum heads and trunnions are made in one piece. Both heads are bolted to the drum. After preliminary machining, the heads and drums are assembled. Then the assembly is finish machined at one setting to insure a true-running drum and accurate alignment of the drum trunnions. The drum is finished with an exceptionally smooth surface. The ends of the drum are also machined, permitting the use of end scrapers that prevent the accumulation of material. The trunnions on which the drum revolves are hollow and are provided with connections through which the cooling medium passes.

## COOLING MEDIUM

The cooling medium used for BUFLOVAK Flakers may be water, brine, or direct expansion refrigeration. In the smaller and shorter drums the liquid cooling medium is deflected over the interior of the drum surface by a specially designed internal baffle that insures a uniform flow along the length of the drum. For the larger sizes more effective distribution is obtained by internal spray nozzles which provide uniform cooling along the whole length of the drum. The cooling medium then is removed by a syphon connected to a pump or operated by maintaining a slight air pressure in the interior of the drum. If water economy or cooling temperature is important, part of the cooling medium may be re-circulated and only enough make-up added to maintain the desired inlet temperature.

*Fig. 2. In this illustration the enclosure has been removed from the Flaker to show the stainless steel drum construction and air vent. Sturdy, welded end frames are used. One of the conveniently located adjusting screws for raising, lowering and levelling the feed pan is shown. The knife holder is mounted on bearing plates with slotted bolt holes which permit adjustment of the knife angle. Thumbscrews in the knifeholder clamp permit close alignment of the knife with the drum. End scrapers at each end keep the drum flanges clean and are adjusted by set screws.*



U. S. PA [illegible]

APR 11 1958

DIVISION 15

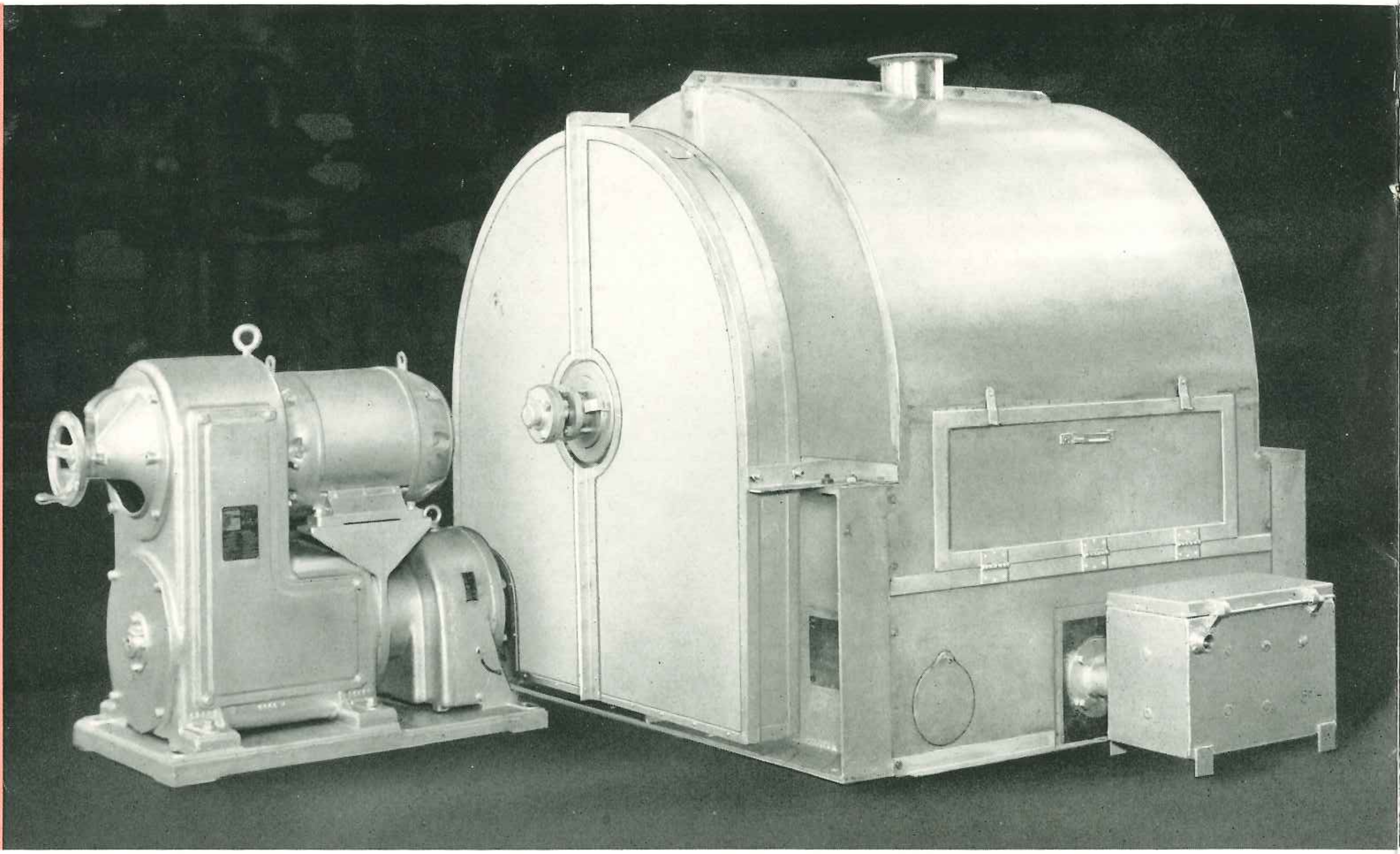


*Fig. 3. This view shows the opposite side of the BUFLOVAK Flaker (48" x 40") illustrated on the preceding pages. Uniform liquid level is maintained in the feed pan by the automatic control shown at the right. Stainless steel is used for all parts coming in contact with the material. The gear and pinion are enclosed in an oil and dust-tight gear guard.*

## BEARINGS

The self-aligning main bearings are designed and built to give long life and uninterrupted service. The bearing base is fastened to the supporting end frame. Removable bearing caps are used. The lower half of the sleeve is provided with a replaceable bronze bushing which can be readily removed in case of wear. Anti-friction bearings are rarely necessary at the comparatively low speeds at which the drum revolves.

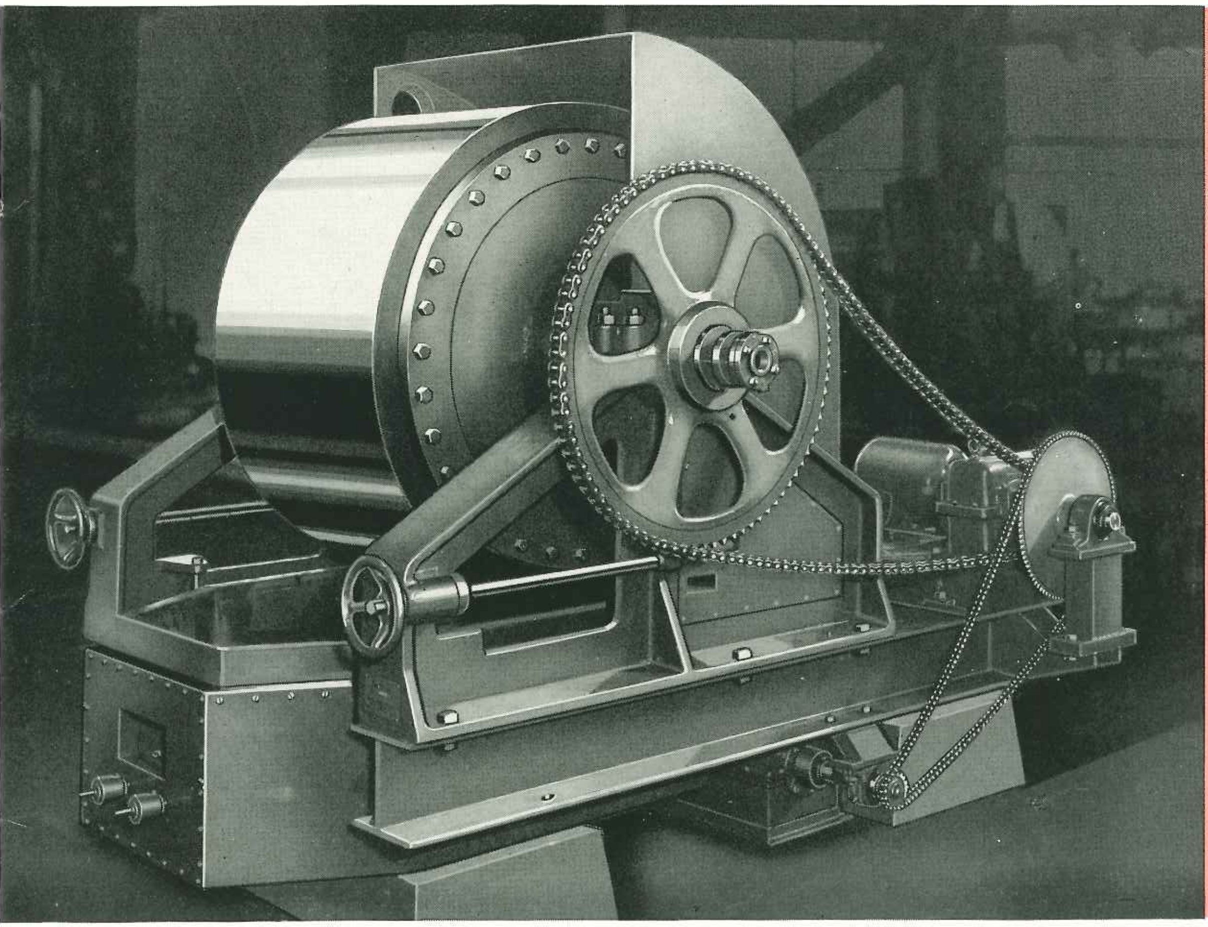
## END FRAMES

The end frames are designed and constructed to rigidly support the main bearings, the knifeholder and adjusting mechanism, and the adjustable feed pan. The end frames are constructed of either cast iron or fabricated from steel plate. In enclosed construction, they form part of the enclosure and then may be lined with a non-corrosive metal or made of clad steel.

## DRIVE MECHANISM

Several types of drive mechanism can be furnished for BUFLOVAK Flakers, suiting them precisely to plant requirements. In keeping with the trend towards individual drives, the main drive usually consists of a cut spur gear and pinion operated through a direct connected motor driven speed reducer, gear head motor, or variable speed transmission.

A roller chain drive can also be furnished. This drive arrangement is frequently used because drum speeds can be changed by using sprockets of different ratios. This is desirable where more than one product is handled, or where seasonal variations in cooling water temperature occur.



U. S. PATENT OFFICE
APR 11 [illegible]
DIVISION 15

Fig. 4. *BUFLOVAK Flaker (48" x 28"), with drive guard removed, equipped with a gas fired feed pan. Used for flaking caustic soda. The speed reducer also drives a breaker mounted below the hood for reducing the size of the flakes. A hopper with discharge gate (not shown) generally is bolted to the bottom of the breaker housing.*

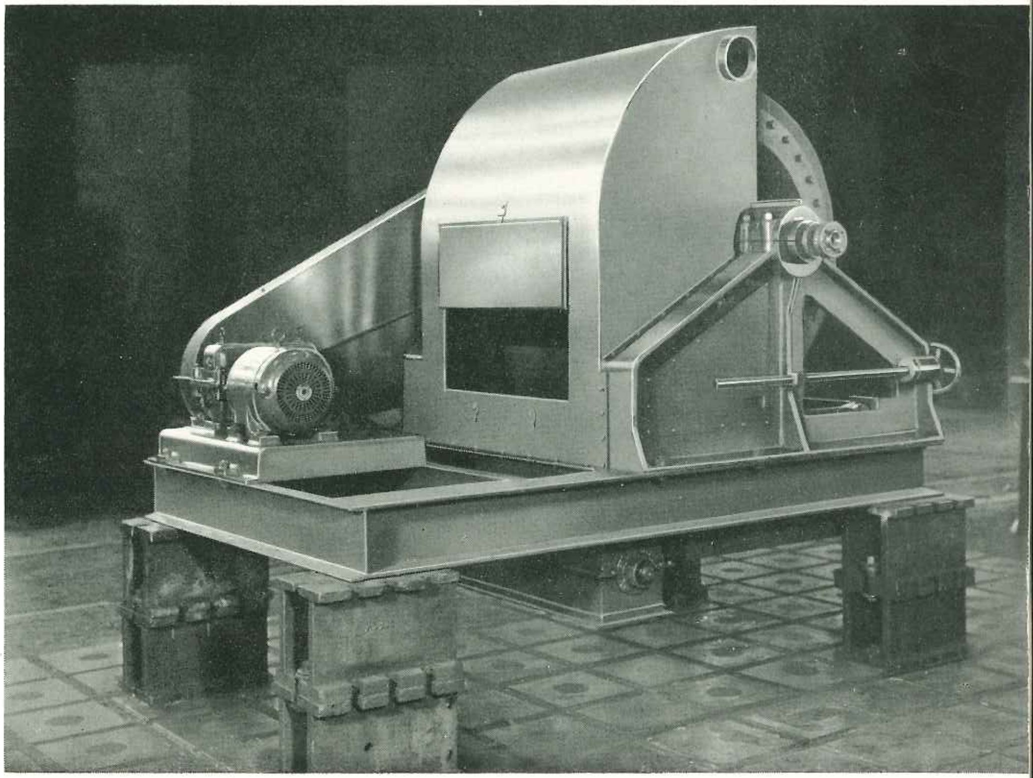
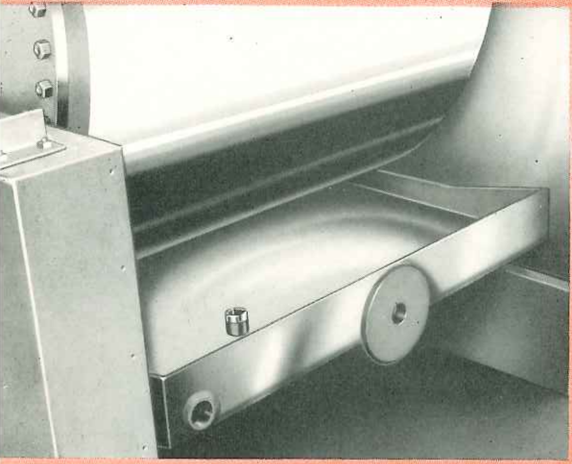


*Fig. 5. This view shows the knife side of the flaker illustrated above. It is equipped with a hood in front with door for access to the knife. The motor and speed reducer are placed well in front of the flaker, away from exposure to heat from the gas furnace. A gear guard encloses the roller chain drives for the drum and the breaker arrangement.*

*Fig. 6. Jacketed, adjustable, stainless steel Feed Pan used on a BUFLOVAK Flaker. It is equipped with an automatic liquid level float control. View shows the overflow, steam and condensate connections.*



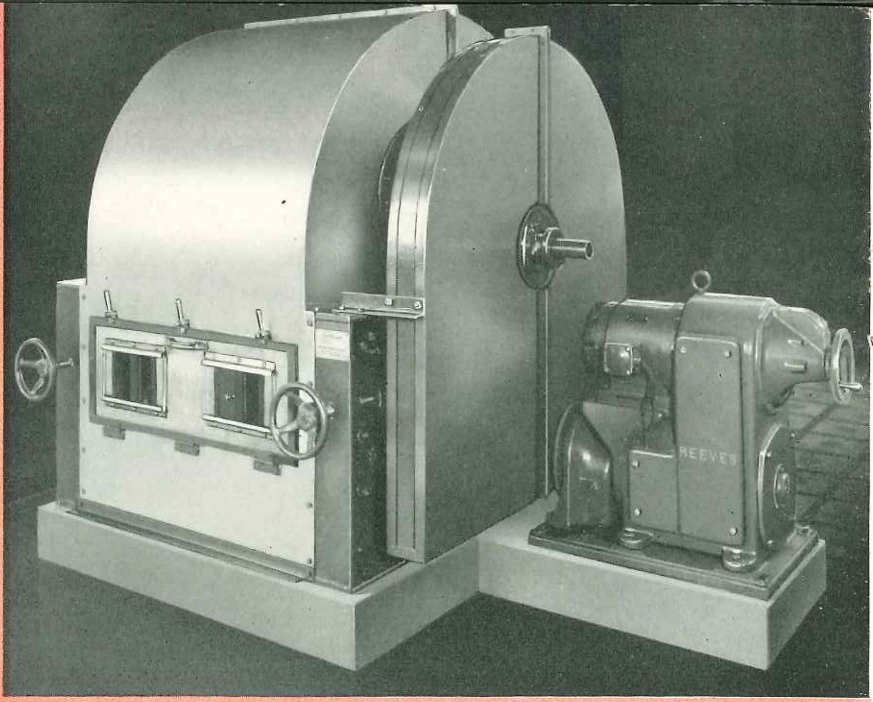
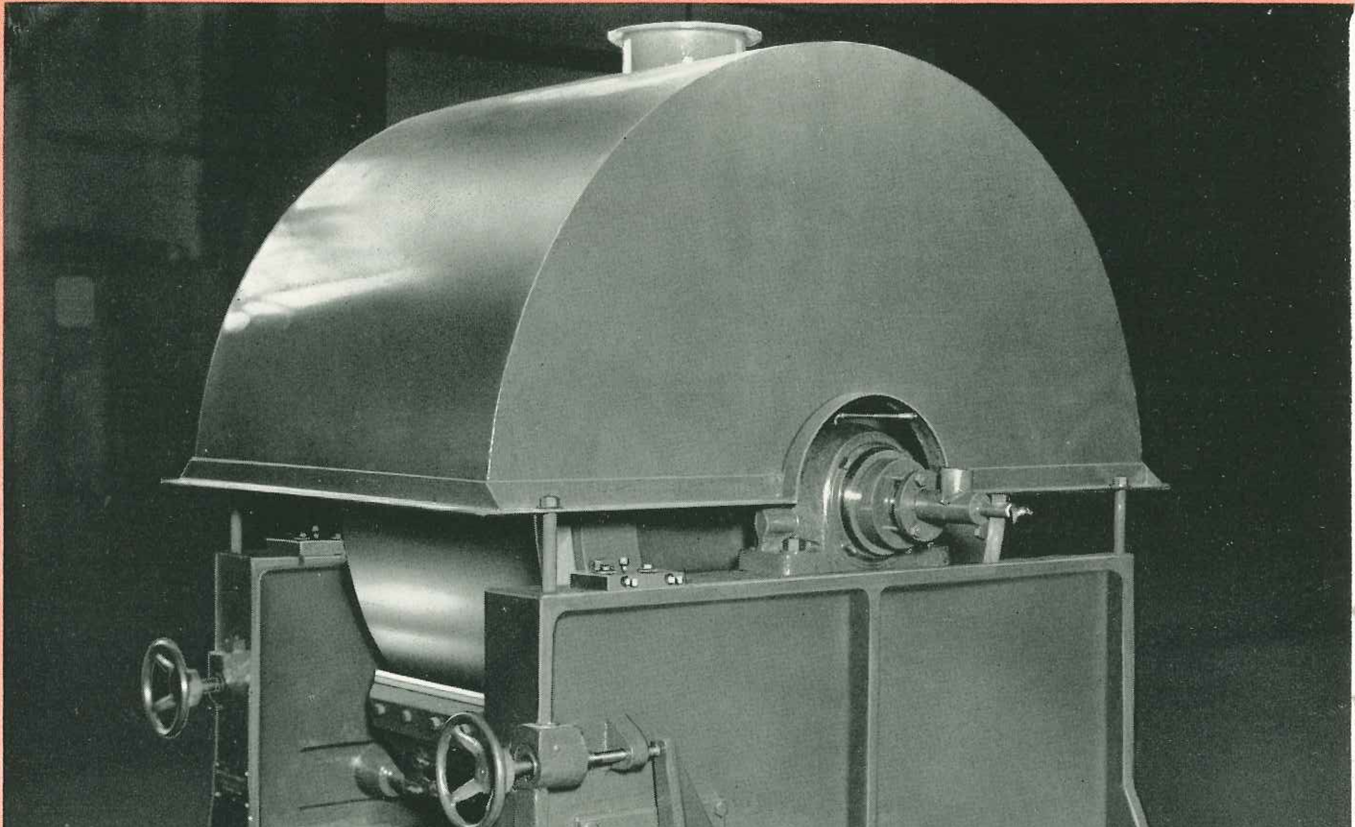


*Fig. 7. BUFLOVAK Flaker (48″ x 28″), with stainless steel enclosure equipped with inspection door and observation glasses. It is used for flaking phthalic anhydride.*

*Fig. 8. BUFLOVAK Flaker (48″ x 28″), equipped with a cast iron drum, bronze knife and self-aligning roller bearings. The hood collects and removes fumes arising from flaking operations. A continuous vent extending through the water inlet prevents accumulation of air in the drum.*



## VARIABLE SPEED TRANSMISSION

For some products, where operations are fairly well standardized, a fixed drum speed is entirely satisfactory. There is a wide variety of other products, however, where it is necessary to vary the drum speed frequently or control it closely. In such applications, a variable speed transmission is indispensable. The thickness of the flake and the capacity of the flaker are affected by the speed at which the drum revolves. Ordinarily the drum speed has a greater effect on flake thickness than on capacity. Increased speed reduces the time of contact between the drum and liquid. A thinner flake is thereby produced. Still an increase in capacity usually is obtained but not in proportion to the increase in speed. A regulation of the drum speed also will compensate for seasonal variations in cooling water temperature.

## ADJUSTABLE FEED PAN

BUFLOVAK Flakers are equipped with an adjustable feed pan, located directly below the drum. The depth to which the drum dips into the liquid material is controlled by an adjustable overflow pipe.

An automatic float control, that regulates the supply of liquid fed to the pan, can also be furnished. When the float control is used, the overflow pipe is adjusted to act as a safety device, preventing the pan from overflowing in the event the float control should become inoperative.

The feed pan is built of any suitable material, and can be heated by either a steam jacket, steam coil, or direct heat, depending upon the material being handled.

Adjustment of the feed pan is provided by means of setscrews as shown in Fig. 2. If it is necessary to lower the pan frequently (to empty it quickly) it can be hinged as shown in Fig. 9.

## KNIFE ADJUSTMENT

The knifeholder and knife are carefully designed and are provided with various adjustments to insure thorough removal of product from the drum, minimum power consumption, and satisfactory knife performance.

The majority of products can be easily removed from the drum surface. In such cases tension on the knife is applied by handwheels arranged for two-way operation of the holder; one located at each end of the flaker. End scrapers keep the drum flanges clean.

In addition, the angle of contact between the knife and the drum may be made adjustable by moving the knifeholder supports as shown in Fig. 2.

For products with greater adhering qualities, a more rigid knifeholder, equipped with additional adjustments, is provided. In this design, the distribution of pressure on the knife can be regulated through adjusting screws correctly spaced along the knifeholder.

Where flexible knives are used, the knifeholder is equipped with closely spaced setscrews that bring the knife into uniform contact along the entire length of the drum, as shown in fig. 2.

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

## UNIFORM FLAKE SIZE

For products requiring a uniform flake size, particularly where the material leaves the drum in the form of large and irregular flakes, the flaker can be equipped to reduce the material to a more uniform size. This material-breaking device is located directly below the knife to receive the material as it leaves the drum, see Fig. 4. It consists of a housing, enclosing a revolving shaft with projecting fingers. The shaft is driven by a chain from the main drive or by a small separate motor. Stationary Bars form a space through which the fingers on the revolving shaft pass and break up the material. Directly below the revolving shaft is a semi-cylindrical screen onto which the material falls and is retained until it is broken sufficiently to pass through the mesh. The housing below the screen forms a hopper. A bottom outlet for the material can be equipped with a gate to regulate the flow into packaging containers and prevent spillage when containers are changed. A conveyor can also be furnished.

## OPERATION

In operating cooling drums, a number of factors affect the capacity and thickness of the flakes. Faster drum speeds increase the capacity, but not in proportion to the speed, because the drum moves more rapidly through the liquid, tending to make the flakes thinner. This condition can be corrected to some extent by changing the depth of the liquid in the feed pan and increasing the area of contact between the drum and the liquid. The cooling water temperature is important because it affects the temperature of the drum surface and the thickness of the film of liquid adhering to the drum. Seasonal variation of this temperature can be corrected by recirculation of part of the water or taken advantage of by increasing drum speed and capacity during the colder season. Feed temperature of the liquid should be as close as possible to the solidification point. This provides a better flake thickness and almost immediate solidification.

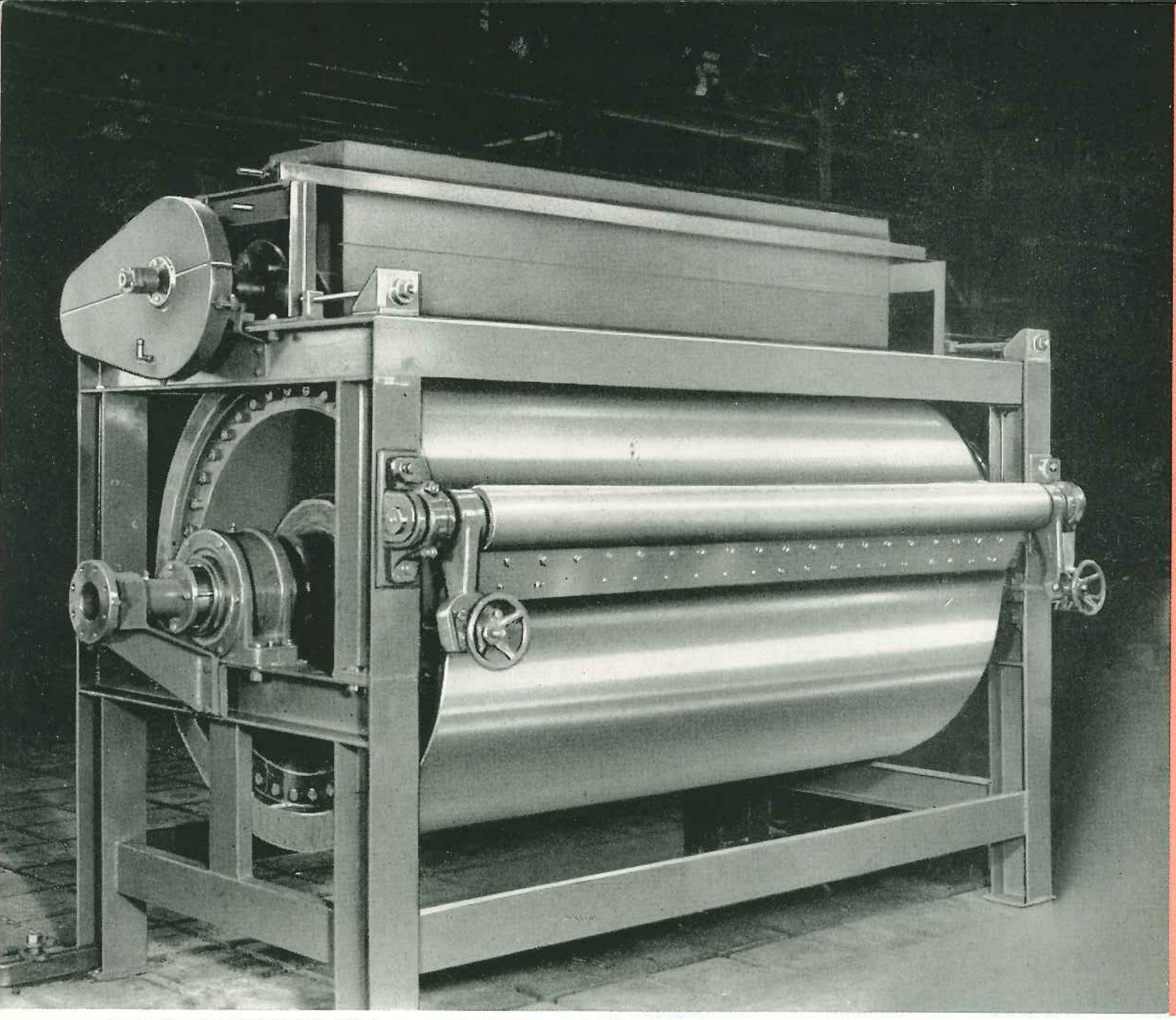


*Fig. 9. BUFLOVAK Flaker with 5' dia. x 8' 5" cast iron drum revolving in roller bearings mounted on a structural steel support which also carries the knifeholder, feed trough, spreading roll, feed trough adjustments, and spreading roll drive. The knife edge is located to permit the material to drop clear without further contact with the drum surface. The drum is cooled uniformly over its entire length by internal spray nozzles.*

# NEW FEATURES FOR FLAKING NEW PRODUCTS

MANY new products of unusual characteristics can now be successfully flaked on BUFLOVAK Flakers. Specially designed flakers are available with new features and refinements necessary to produce a product suited to market or process requirements. Some of these special features, available as standard accessories, are described and illustrated on these pages.

## IMPROVED METHOD OF FLAKING MATERIALS SUBJECT TO SUPERCOOLING

Products subject to supercooling, which do not solidify readily, are successfully handled on BUFLOVAK Flakers equipped with a completely new feed system designed for such requirements. The system provides for the application of a film of material to the drum surface and simultaneously overcomes the tendency of such materials to remain fluid.

By cooling many of these products below their normal solidification temperature, production is increased and a uniform, rapid solidification is obtained.

The unique design of the feed system provides for various adjustments to insure maximum capacity and the most satisfactory operating results.

Only a small amount of material is held at the high melting feed temperature, thereby avoiding possible damage either by heat, length of exposure, or the combination of both.

Frequently, this method of feeding produces thicker flakes than is ordinarily obtained by conventional drum flakers.

The unique action of this feeding system provides the necessary agitation in the liquid material to promote rapid and complete solidification. Greater capacities are obtained because there is a more uniform film formation and better utilization of the cooling surface.

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

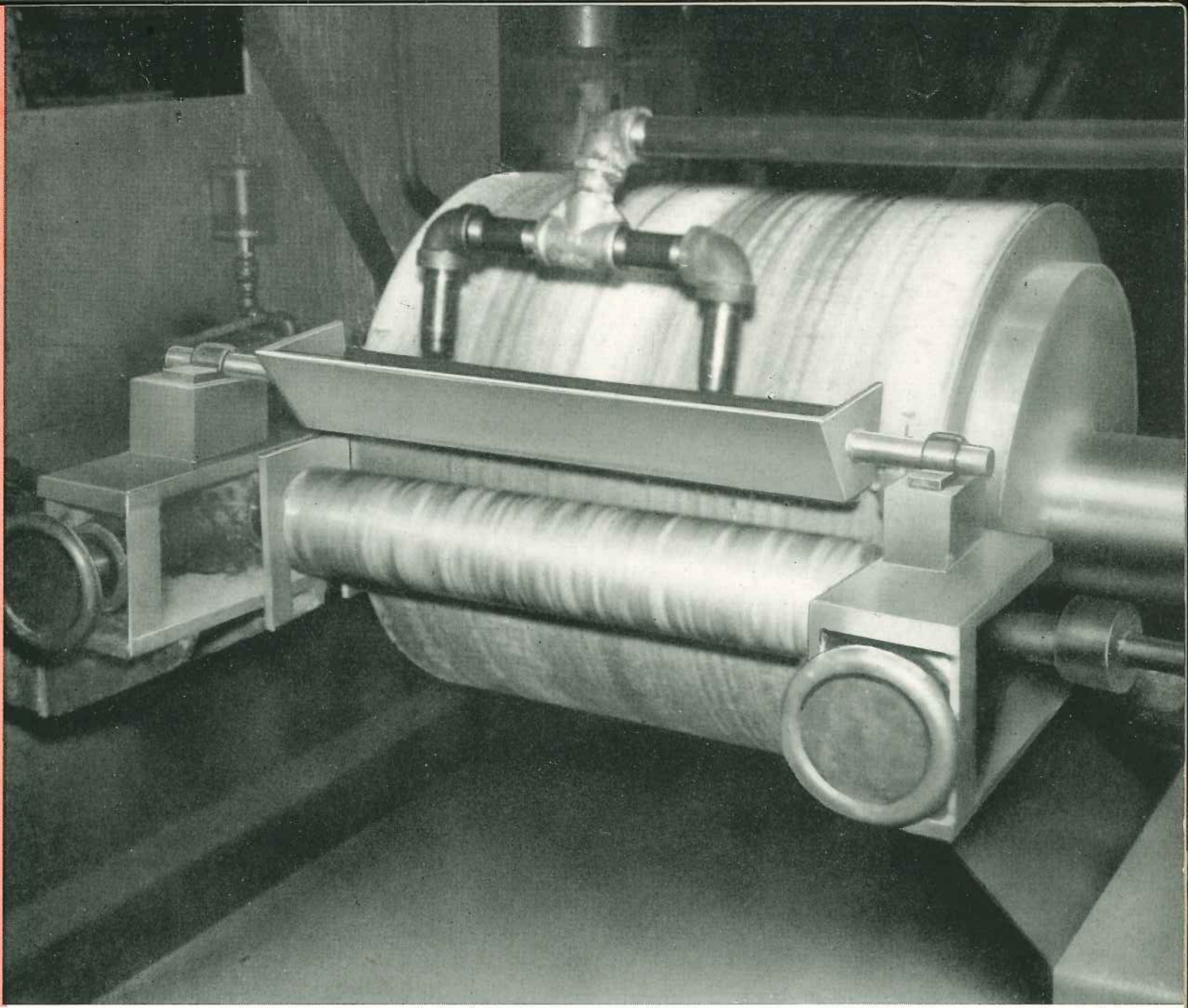


*Fig. 10. A 24" x 24" Cooling Drum installed in the BUFLOVAK Research and Testing Laboratory, equipped with a special feed system. It is successfully used for products requiring the start of crystal growth by controlled temperature and agitation at the point of application to the cooling drum.*

## TOP FEED

A top feed gives excellent results when the liquid product, such as soap, is too heavy or viscous to be applied properly to the drum surface by dipping the drum into the liquid in a feed pan.

## CLOSED FEED

A closed, self-sealing feeding device is recommended for products which are heat sensitive or are affected by exposure to the atmosphere. This method of feeding requires only a small amount of molten material in the feeding device. Being a closed system, oxidation is prevented. The molten feed material is completely processed at the end of the operation.

## SPREADING ROLL

Another type of feeding device consists of a feed trough used in connection with a revolving spreading roll placed close to the trough. A modification of this principle is to feed the liquid directly behind the roll.

The roll spreads the material over the drum surface in a layer of uniform thickness. Clearance between the roll and the drum is adjustable to regulate the thickness of the film being applied to the drum. The knife-holder can be placed close to the feed trough to utilize the maximum available cooling surface, as shown in the above illustration.

## WETTING ROLL

The adherence of some materials, such as niter cake, on the drum can be greatly lessened by a device that wets the drum just before it dips into the hot liquid material. It consists of a wetting roll that automatically applies a thin film of moisture to the drum surface. This roll can be regulated to obtain any desired application of moisture. Production is increased, power is saved, and knives last longer, because the solidified material is more easily removed from the drum surface.

## SPECIAL FLAKERS

Special BUFLOVAK Flakers successfully process such materials as epoxy resins, corn syrup, and other similar products which normally cannot be picked up as a film on the cooled surface of a conventional drum. A combination of unique features and other modifications provide good operating results.

# PROTECTION FROM DUST AND TOXIC HAZARDS

BUFLOVAK Flakers can be furnished in completely enclosed types, that give protection against dust and toxic hazards. The enclosure can be made of any sheet metal that is suited to the particular application.

In all types, hinged doors extending the full length of the drum, give access to the knife and feed pan. Observation glasses usually are provided at convenient points to observe internal operation. An outlet is located in the upper part of the housing, arranged for connection to a stack or exhaust fan if a flow of air through the enclosure is desired. The suction in the outlet generally is sufficient to permit a slight clearance in the casing around the trunnions. If the enclosure must be dust-tight, stuffing boxes are provided around the trunnions. The housing that encloses the flaker is usually supported on the end frames which may be lined or clad with stainless steel or other metals. Removable cover plates are provided in the end frames to give access to the feed pan adjusting screws and end scrapers. Bearings are mounted entirely outside the enclosure to protect them from fumes and dust. Vapor-tight enclosures in addition are closed at the bottom.

Since the flakers are frequently set in an elevated position, a suitable structural support can be furnished as an integral part of the unit. In this design the main bearings are mounted on this support, eliminating the need for end frames.

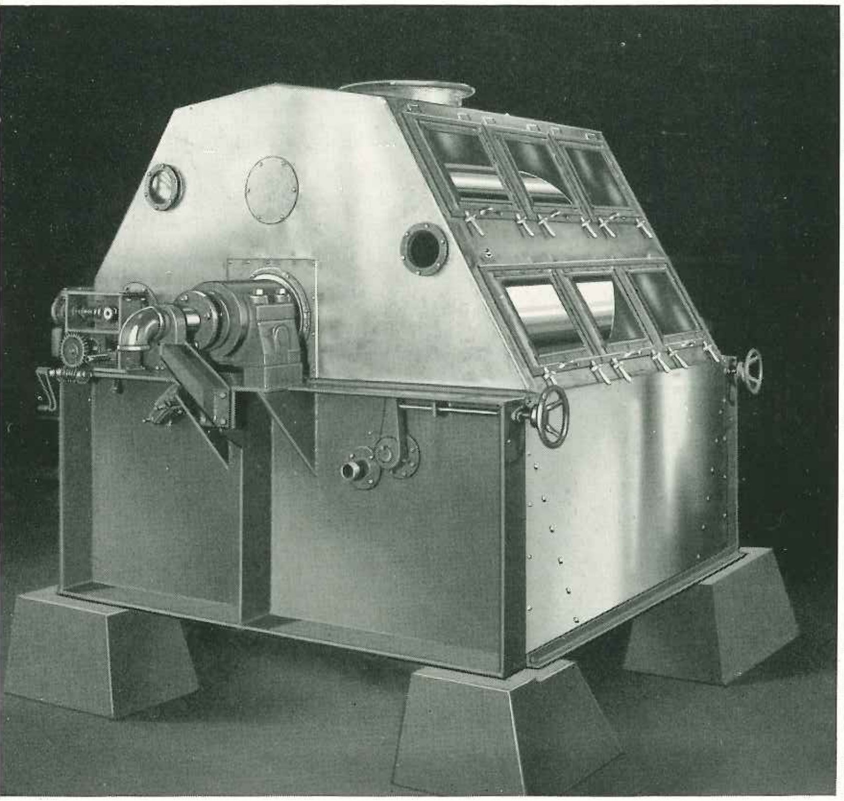


*Fig. 11. BUFLOVAK Enclosed Flaker (48″ x 60″), equipped with a Conditioning Roll. All operating controls for the knifeholder, end scrapers, conditioning roll and lowering of the feed pan are conveniently located on the outside of the enclosure.*

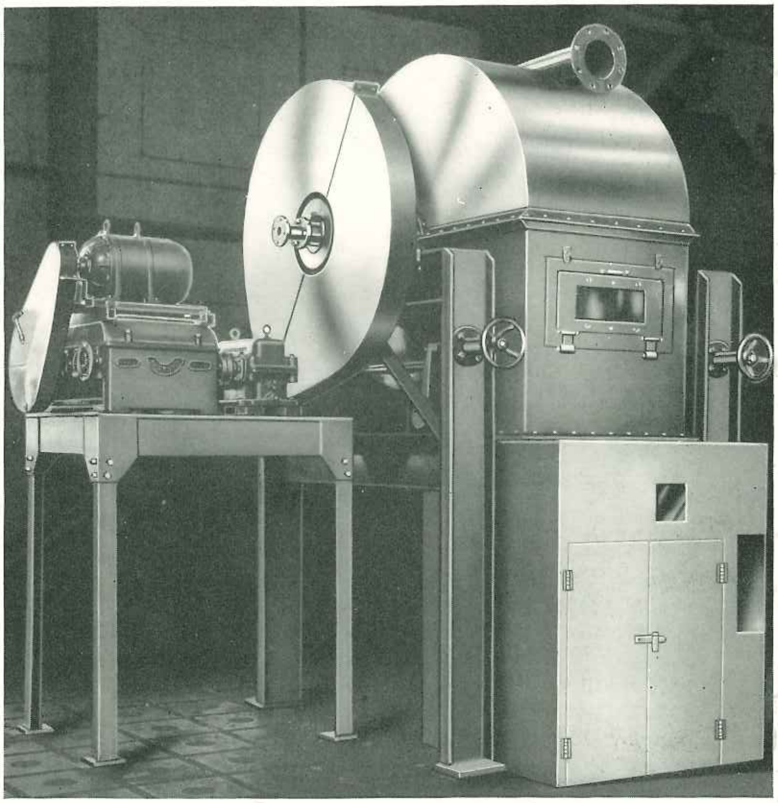


*Fig. 12. BUFLOVAK Enclosed Flaker (48″ x 28″), used for flaking TNT. It is equipped with a variable speed transmission. The flaker is completely enclosed including a chamber with door for collecting the flakes directly in the shipping container. A discharge gate in the hopper is provided to prevent spillage when containers are changed.*

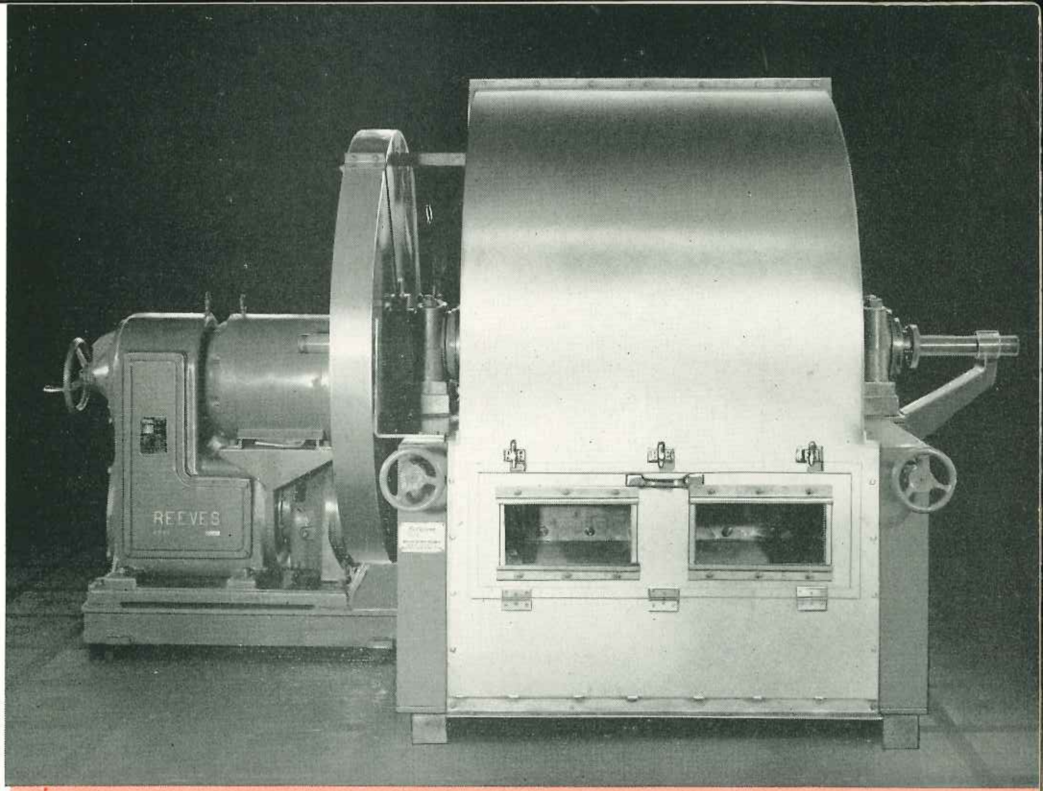


*Fig. 13. BUFLOVAK Flaker (48″ x 28″) with chromium plated cast iron drum running in self-aligning bearings mounted on stainless lined steel frames which form part of the vapor tight enclosure with stuffing boxes around the trunnions. Internal spray nozzles provide uniform cooling. Observation doors in front and back give access to knife and feed pan. Variable speed Moto-drive.*

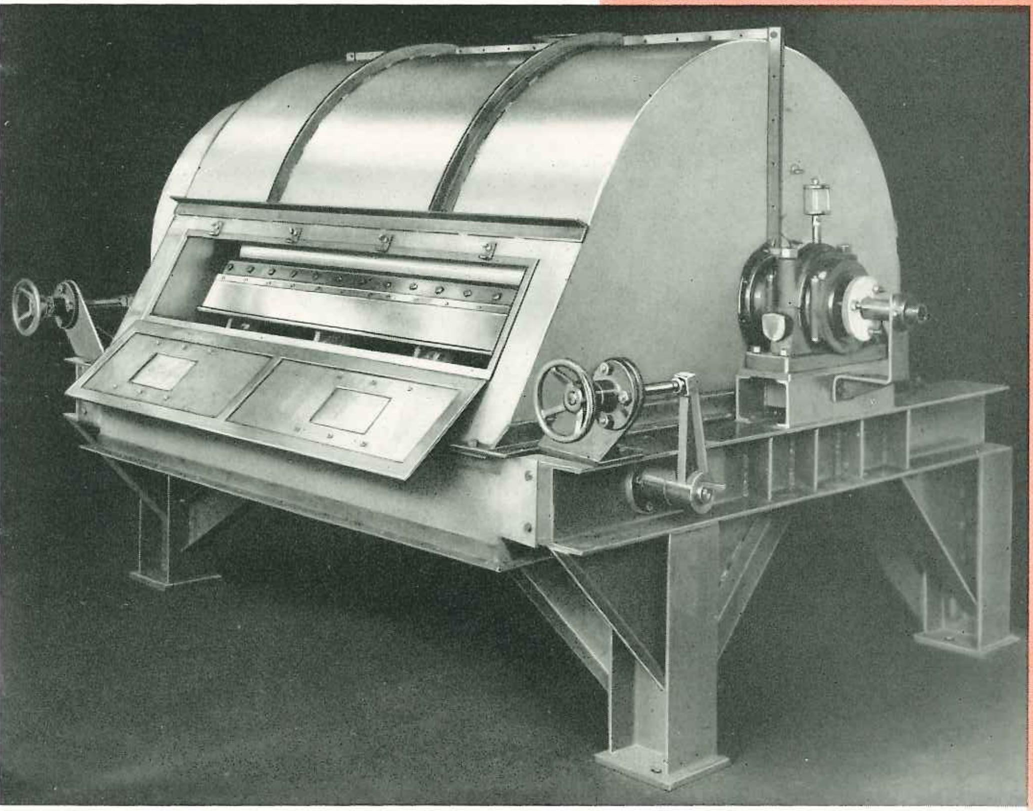


*Fig. 14. BUFLOVAK Flaker (48″ x 72″), enclosed with a stainless steel casing. It is also equipped with a stainless steel, jacketed feed pan. The drum is cadmium plated on the inside. Flaker is specially designed to successfully handle a corrosive material. The self-aligning bearings are entirely outside the enclosure, protected against dust and corrosion. They are mounted directly on the structural steel support which can be made of any suitable height. The slanting door in the enclosure makes the knife readily accessible.*

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

# BUFLOVAK TWIN and DOUBLE DRUM FLAKERS

## FOR FLAKING MATERIALS WITH HIGH MELTING POINTS

BUFLOVAK Twin and Double Drum Flakers are successfully used for flaking materials that have an extremely high melting point. Particularly is this true if the material from a furnace can be piped directly to the flaker for continuous or intermittent feeding. If the product is made in a crucible, in batches, the crucible can be lifted from the furnace, moved to the flaker and discharged. The hot molten material is fed directly between the drums at the top. To obtain the best possible results, the liquid should be applied to the drum at a temperature as close to the solidifying point as possible. This makes it impossible to use a conventional single drum flaker with a feed pan below the drum. In such a pan, the liquid would have to be kept at a much higher temperature to prevent skin formation on the surface which would prevent the material forming a uniform coating on the drum. All these difficulties are overcome by the direct feed used on the Twin and Double Drum Flakers.

The cooling medium is distributed uniformly over the length of the drums by internal rows of spray nozzles which are arranged to direct most of the cooling fluid against the section of the drums where the material already has solidified. In this way, the solid product is cooled to the lowest possible temperature before it is removed by the knives.

All material fed to the flaker is completely processed and is removed as a finished flaked product.

The Twin Flaker drums turn upward, away from the closest point of contact. The flaked material is removed by a knife located at the lower, outer quadrant. Individual conveyors are provided for each drum. They may be equipped with material breakers to reduce the flakes to a uniform size.

In another arrangement, the knives are located at the lower, inner quadrant, directly under the pinch. The flaked material from both drums drops into a single conveyor, thus utilizing the greatest possible cooling surface.

In the Double Drum Flaker, the material is also fed from the top between the drums. The drums rotate in the opposite direction of the Twin Drum Flaker, rotating downward from the closest point of contact. The clearance between the drums can be adjusted and used to control the thickness of the flake. Both types are available with 16″, 24″, 32″, 42″ and 60″ diameter drums. They can be enclosed to eliminate dust or toxic hazards.

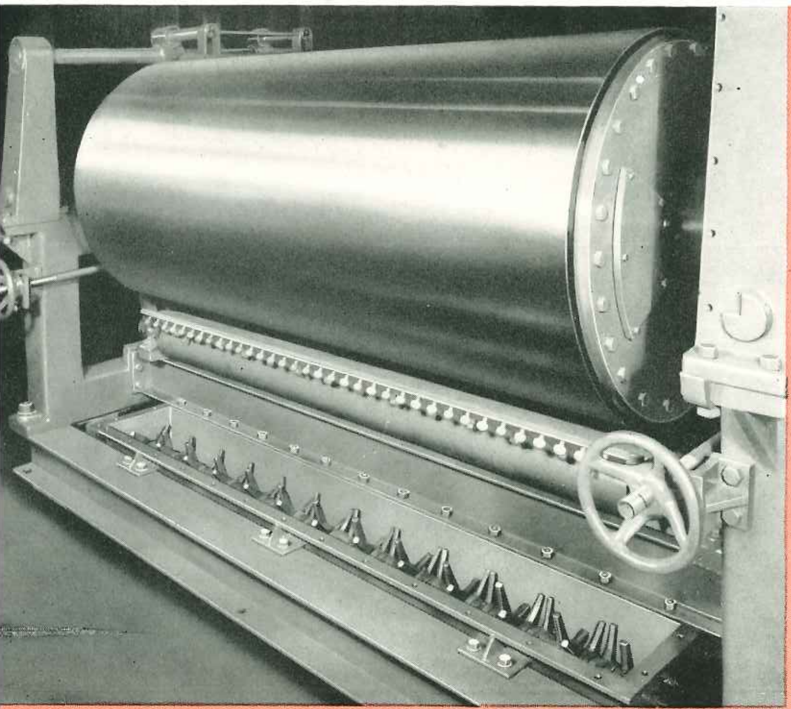


*Fig. 15. BUFLOVAK Twin Flaker (32″ x 72″), with shields removed to show the knife and one of the material breakers. Thumbscrews in the knifeholder clamp permit accurate adjustment of the knives against the drums.*

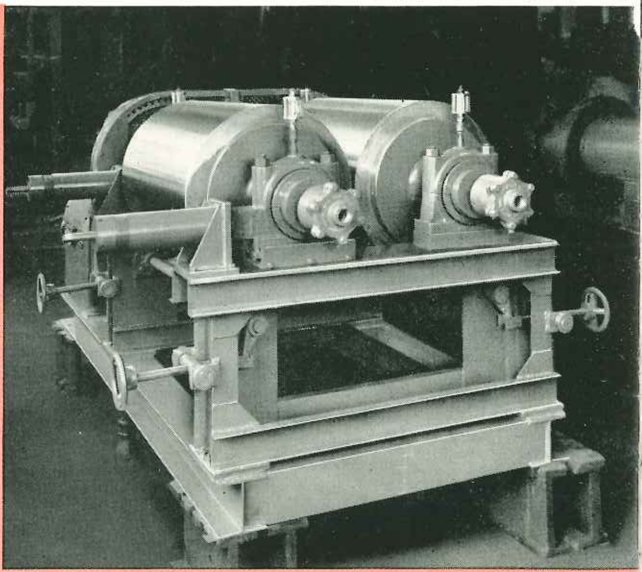


*Fig. 16. BUFLOVAK Double Drum Flaker with 24″ x 36″ cast iron drums mounted in self-aligning bearings on fabricated steel frames, cooled by internal spray nozzles with rotary joints for entrance and exit of the coolant. A spring type adjustment on one of the drums allows them to spread when excessive pressure is developed and original clearance to be re-established automatically when pressure returns to normal. Stops prevent drums from being pushed together too closely.*

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

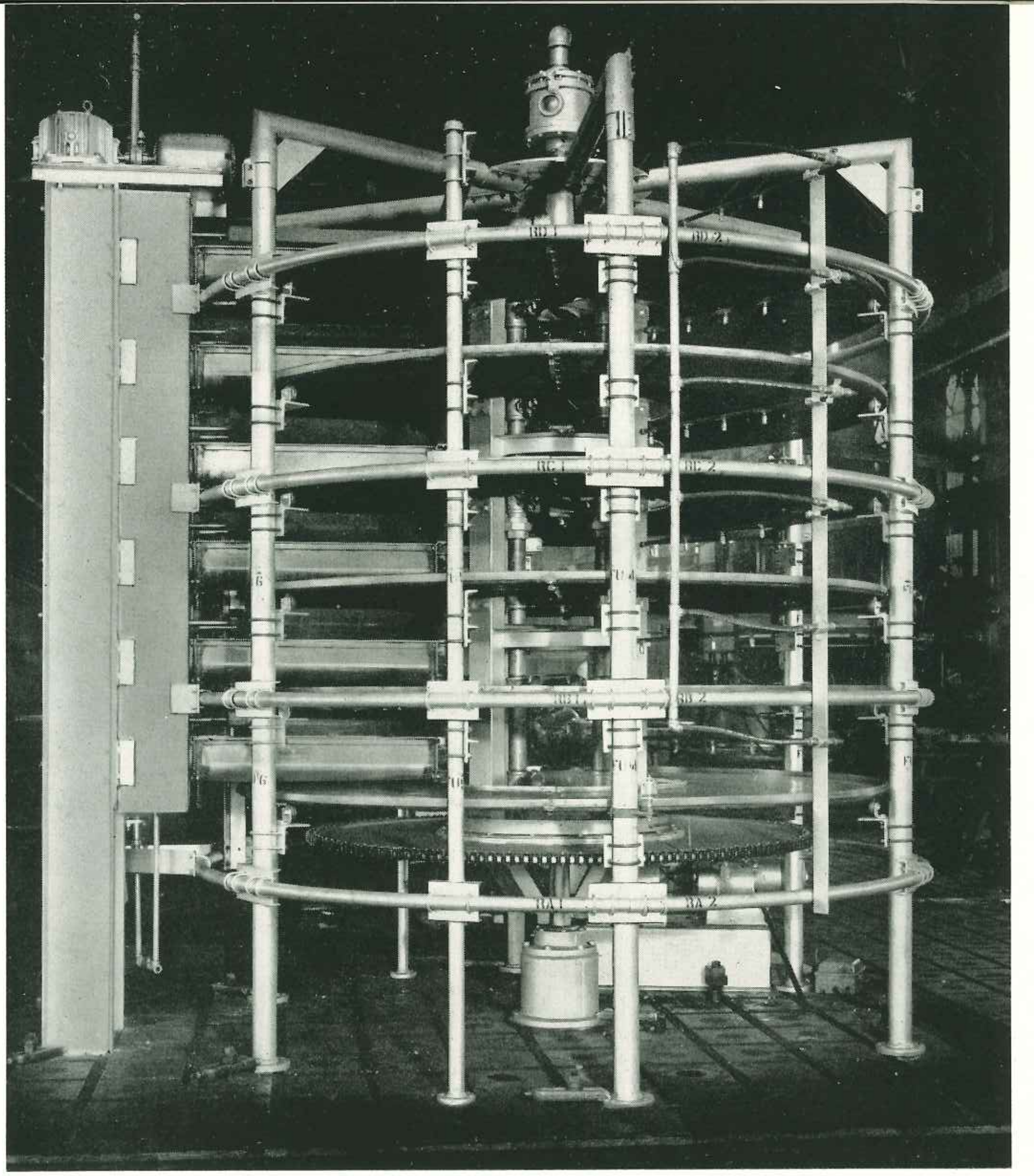


*Fig. 17. Roto-Shelf Coolers continuously cool and solidify sulphur and similar molten products.*

# BUFLOVAK ROTO-SHELF COOLERS

## FOR PRODUCTION OF CAKES OF ANY DESIRED THICKNESS

The BUFLOVAK Roto-Shelf Cooler (patented) has been designed specifically to produce cakes of any desired thickness. This cooler has found particular application in converting liquid sulphur directly into lumps ½″ to ¾″ thick.

The liquid is pumped through a steam-jacketed perforated feed pipe from which it flows onto a slowly revolving water-cooled stainless steel shelf. Just ahead of the feed pipe, a film of moisture is applied to release the cake after it has cooled. After the top surface has cooled sufficiently, a fine water spray assists in solidifying the cake. Speed of the shelf is regulated by a variable speed drive to accomplish complete solidification.

The solid cake is lifted off the shelf and pushed up a ramp by its own motion. At the top of the ramp it passes under a guide roll and is broken up into lumps by a set of revolving breakers. The material then drops into a conveyor which discharges the lumps into a chute on the outside of the shelf.

The Roto-Shelf Cooler is built with any number of shelves from 1 to 10. The Roto-Shelf Coolers are fully equipped with manifolds for cooling water, feed pipes, wetting pipes and spray pipes. A variable speed drive operates the shelves which are mounted on a central support and supported at the edge by guide rollers. Feed pipes can be replaced individually if necessary, without interrupting production on the other shelves. A second drive operates all the conveyors and breakers. Supports are arranged to permit installation of additional shelves when production has to be increased.

Shelves are jacketed and baffled to provide uniform and efficient cooling. Each shelf has a single water inlet and outlet connected to a manifold and regulated separately. To maintain uniform temperatures throughout the year only part of the water is discharged and the balance re-circulated.

Experimental unit is available in our Research Laboratory for tests.

# PILOT PLANT FLAKERS and COOLING DRUMS

## AID IN DEVELOPING NEW PRODUCTS

In the development of a new process or a new product, it is particularly important to establish as soon as possible the final form in which the product will reach the market, in order to solve packaging problems and establish a sound basis for market research. To this end, BUFLOVAK Pilot Plant Flakers are available in a number of sizes: 6″ x 8″, 12″ x 18″, 24″ x 20″, 24″ x 30″ and 24″ x 36″. These units are designed on the same basic principles as the larger commercial units. Their installation permits the investigation of the effect of the various operating factors; such as, drum speed, feed temperature of the liquid, cooling water temperature, and depth of liquid in the feed pan, on the size and thickness of the flakes, as well as on the capacity of the equipment.

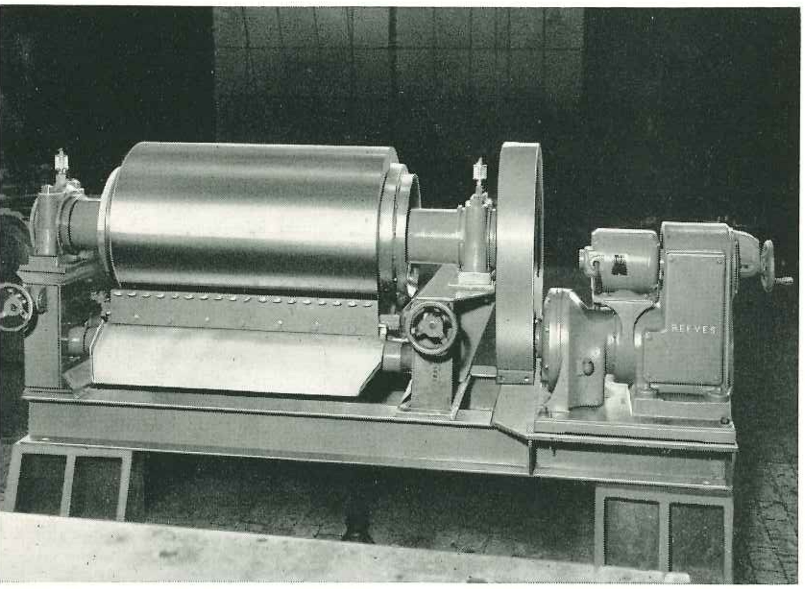


*Fig. 18. BUFLOVAK Flaker with 24″ x 36″ chromium plated cast iron drum mounted on self-aligning bearings, spray nozzles for uniform distribution of the refrigerated cooling water over the length of drum, and variable speed Moto-drive for instant adjustment of the drum speed. Knifeholder clamp arranged with thumb screws for accurate alignment of the knife with the drum.*

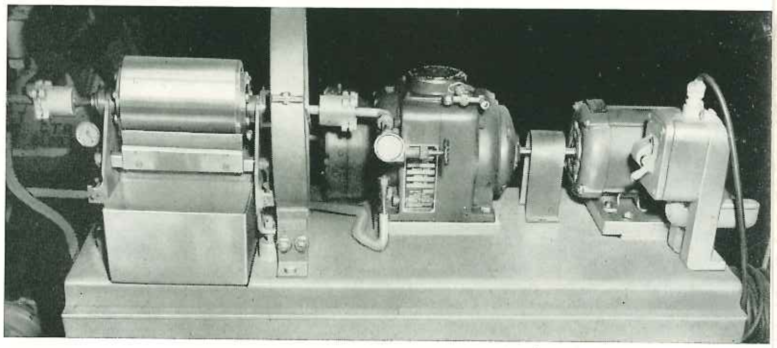


*Fig. 19. Laboratory Flaker, 6″ x 8″, with chromium plated drum, adjustable feed pan and variable speed drive.*

### BUFLOVAK SINGLE DRUM FLAKERS AND COOLING DRUMS—TABLE OF SIZES

| (1) Drum Dimensions | 24″Dia x 20″Lg. | 24″Dia. x 30″Lg. | 48″Dia. x 28″Lg. | 48″Dia. x 40″Lg. | 48″Dia. x 60″Lg. | 60″Dia. x 72″Lg. |
|---|---|---|---|---|---|---|
| Cooling Surface sq. ft. | 10.5 | 15.8 | 29.4 | 42 | 63 | 92 |
| Proportional Capacity | 1 | 1.5 | 2.8 | 4 | 6 | 8.75 |
| (2) Horse Power | 2 | 2.5 | 3 | 5 | 6 | 7.5 |
| Water Connection | 1¼″ | 1¼″ | 2″ | 2″ | 3″ | 4″ |
| (3) Dimensions | 3′4″ x 6′11″ | 3′4″ x 7′9″ | 5′7″ x 7′7″ | 5′7″ x 8′7″ | 5′7″ x 10′3″ | 6′7″ x 12′0″ |
| (4) Floor Space | 8′4″ x 12′0″ | 8′4″ x 13′0″ | 10′7″ x 13′0″ | 10′7″ x 14′2″ | 10′7″ x 16′0″ | 11′7″ x 18′0″ |
| (5) Height | 3′0″ | 3′0″ | 5′9″ | 5′9″ | 5′9″ | 6′9″ |
| (6) Weight, lbs. | 1800 | 2300 | 5700 | 7200 | 11,600 | 18,500 |

(1) Length of drums can be varied to suit individual requirements.
(2) H.P. based on average operating conditions. Varies with products.
(3) Dimensions without drive.
(4) Includes working space and allowance for maximum size drive.
(5) Height includes vapor hood or closure.
(6) Weight flaker only. Does not include vapor hood or drive.

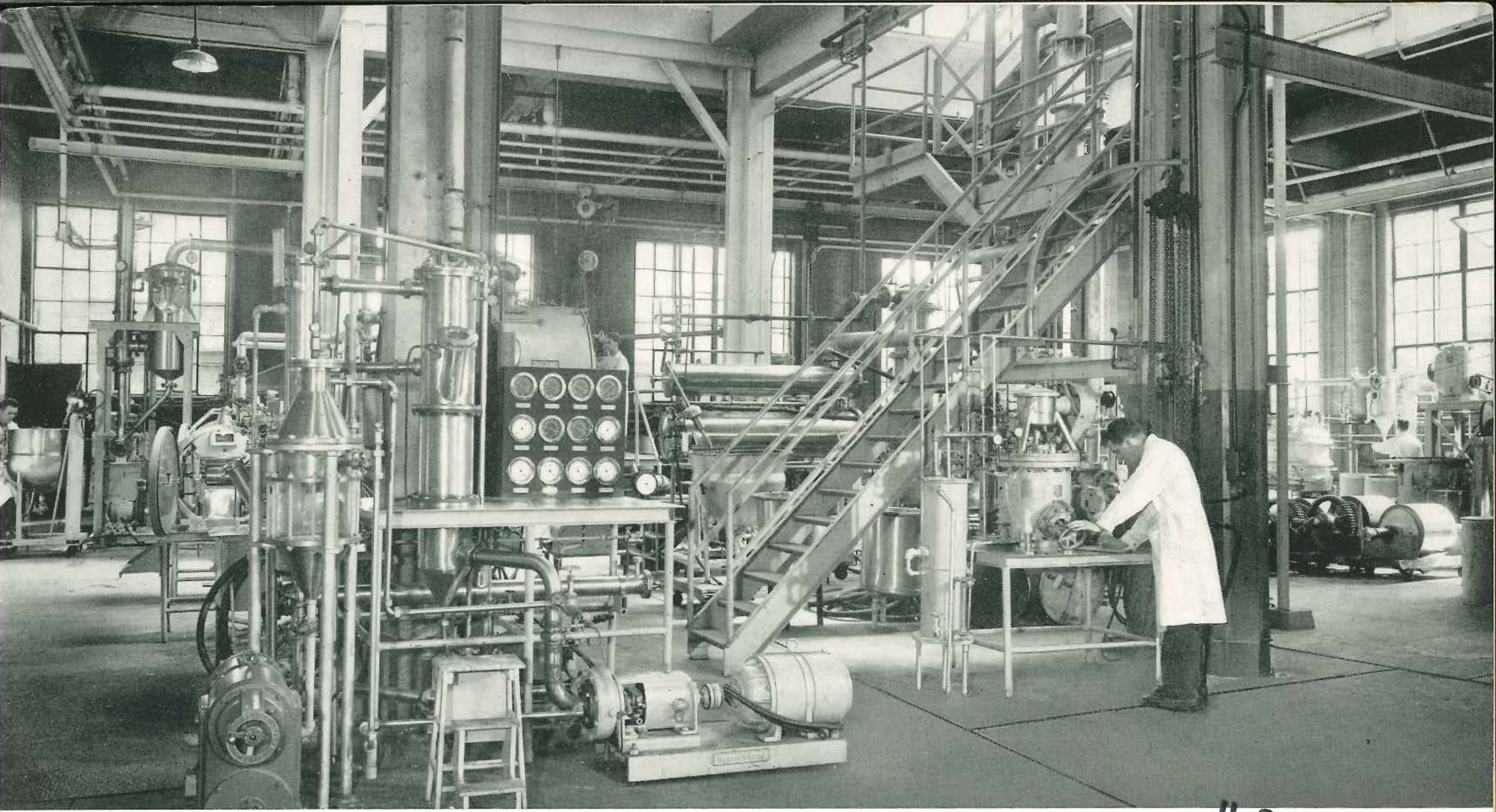


*Fig. 20. Some of the Pilot Plant Equipment in the BUFLOVAK Research and Testing Laboratory. Forced Circulation Evaporator at the left. 5-gallon Jacketed Kettle with agitator at the right.*

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

# Buflovak PILOT PLANT PRE-TESTING

## FINDS BETTER PROCESSING METHODS FOR CHEMICAL AND FOOD PRODUCTS

*Send for Catalog 358*

BUFLOVAK Research and Testing Laboratories are maintained for your use . . . to help you solve problems in flaking, drying, evaporation, extraction, solvent recovery, crystallization, and food processing.

Complete with pilot plant equipment for low-temperature evaporation, drying, and other advanced processes, these facilities develop improved processing operations.

Here tests can be completed, ranging from a few beakers of precious material to tank-car quantities requiring round-the-clock operation on a production scale. Results are definite! Production data is accurate! BUFLOVAK'S pre-testing has given the right answer to over 7500 processing problems!

Many new methods, highly profitable to their users, have been developed for use in the Chemical, Food, Pharmaceutical and other fields.

Your investment in BUFLOVAK Equipment is safeguarded by pre-testing your product to prove at the start whether you are on the right road to profits.

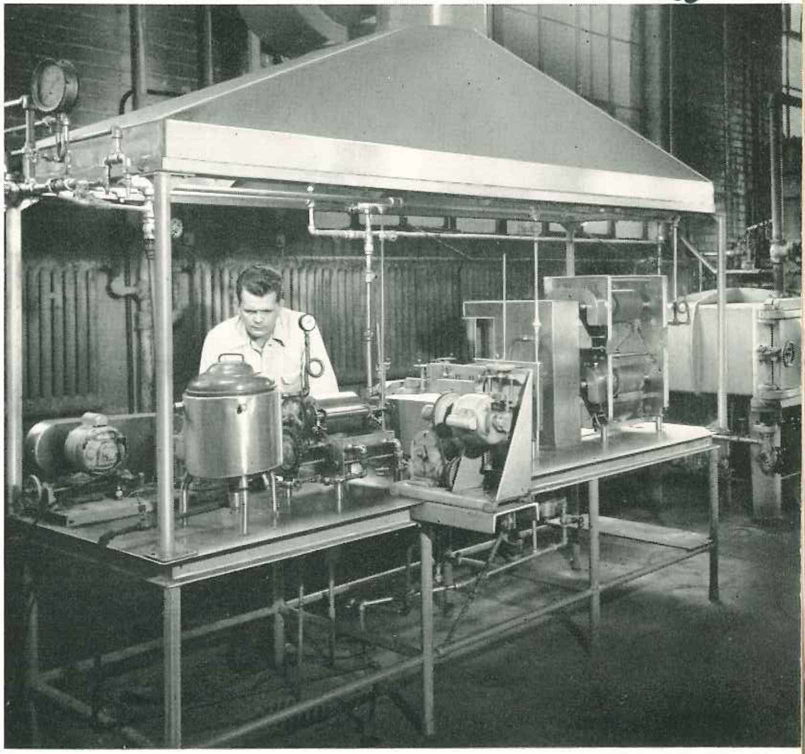


*Fig. 21. Laboratory size Single Drum Flaker with 6″ x 8″ drum, conditioning roll and melting tank for the material, and separate variable speed drives for drum and roll.*

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

# BUFLOVAK EQUIPMENT

## *Profitably Serves the Process Industries with Modern Cost-Cutting Equipment*

### CHEMICAL PLANT EQUIPMENT

AUTOCLAVES, High Pressure
CAUSTIC POTS
COOLING DRUMS
CRYSTALLIZERS
DESOLVENTIZERS
FILTER DRYERS
PROCESSING KETTLES
NITRATORS
REDUCERS
RETORTS
ROTO-SHELF COOLERS
SULPHONATORS

### DRYERS (Atmospheric)

DOUBLE DRUM • SINGLE DRUM • TWIN DRUM
JACKETED PAN • STEAM TUBE

### DRYERS (Vacuum)

CHAMBER
DRUM—SINGLE AND DOUBLE
IMPREGNATING
PAN
ROTARY
SHELF

### EVAPORATORS

BATCH AND CONTINUOUS • CALANDRIA • DOWNFLOW
FORCED AND NATURAL CIRCULATION • KARBATE AND RUBBER LINED
LOW TEMPERATURE • ROTO-VAK HIGH CONCENTRATOR • SALTING OUT • SANITARY
SINGLE AND MULTIPLE EFFECTS

### FABRICATED PROCESSING EQUIPMENT

ALUMINUM • BRONZE
COPPER • INCONEL • MONEL
NICKEL • NICKEL-CLAD • STEEL
STAINLESS STEEL • STAINLESS-CLAD

### GAS PROCESSING EQUIPMENT

GAS CLEANERS
FOGGERS
TRACYFIERS
SEPARATORS

### FOOD PROCESSING EQUIPMENT

DEOILERS
DOPP KETTLES
DRYERS
EVAPORATORS
EXTRACTORS
FUMIGATORS
PROCESSING KETTLES
STERILIZERS

### KETTLES

BI-METAL • CAST-IN-COILS • DOPP • FUSION • GRAINING
JACKETED • RESIN • RETORT

### VULCANIZERS

FOR RUBBER FOOTWEAR, ETC.

**DISTILLATION APPARATUS • SPECIAL MACHINERY • STILLS • CODE WELDED FABRICATION • PILOT PLANT EQUIPMENT • QUICK-OPENING DOORS**

Buflovak, Buflokast, Bufloweld—Trade Names Reg. U. S. Pat. Office

Printed in U. S. A.

U. S. PATENT OFFICE
APR 11 1958
DIVISION 15

BLAW-KNOX

**BLAW-KNOX COMPANY**
BUFLOVAK EQUIPMENT DIVISION
1543 FILLMORE AVENUE • BUFFALO 11, NEW YORK